Mercury

by E. M. Campbell and S. Payne

Mercury is a proposed laser system that is in the process of being evaluated. The main vision of this proposed laser system is to begin to develop the next generation of Inertial Confinement Fusion laser technology. While the basic laser-driver technology is still based on solid state lasers as it is for the National Ignition Facility (NIF), there are several proposed enhancements to the system components. In particular, laser diode arrays will replace the flashlamps that are now used, laser crystals will be substituted for the laser glass elements planned for the NIF, and finally an advanced form of gas-cooling will be deployed to increase the repetition rate of the laser by quickly removing the waste heat. The main advantages sought by the development of these enhanced technologies are to substantially increase the laser efficiency (10% compared to 1% for NIF) and the repetition rate (10 shots per *second* compared to 1 shot every 4 hours). Among the technical challenges the system will address are the need to devise a low-cost, low-duty factor laser diode package and perfect the growth of high quality laser crystals. The proposed laser system architecture would represent both an advanced type of driver system for the purpose of stockpile stewardship needs and serve as a basis for eventually producing electricity by way of laser fusion power. The present proposal is to build a 100 Joule prototype laser, an energy level quite modest compared to the 1,800,000 Joules that will be produced by the NIF. Since a technology development plan directed at offering fusion-scale facilities is extremely demanding, often requiring decades to perfect, the initiation of this effort is in the spirit of pursuing a forward-looking activity that prepares us to have future technology solutions in-hand and on-schedule to service the national interest in defense and energy. The proposed cost is estimated at $7-9M over a 3 year period; therefore, it is not a major system acquisition and construction project. It is currently not funded but is being reviewed by LLNL's internal Laboratory Directed Research and Development (LDRD) committee for possible funding beginning in October of 1996.

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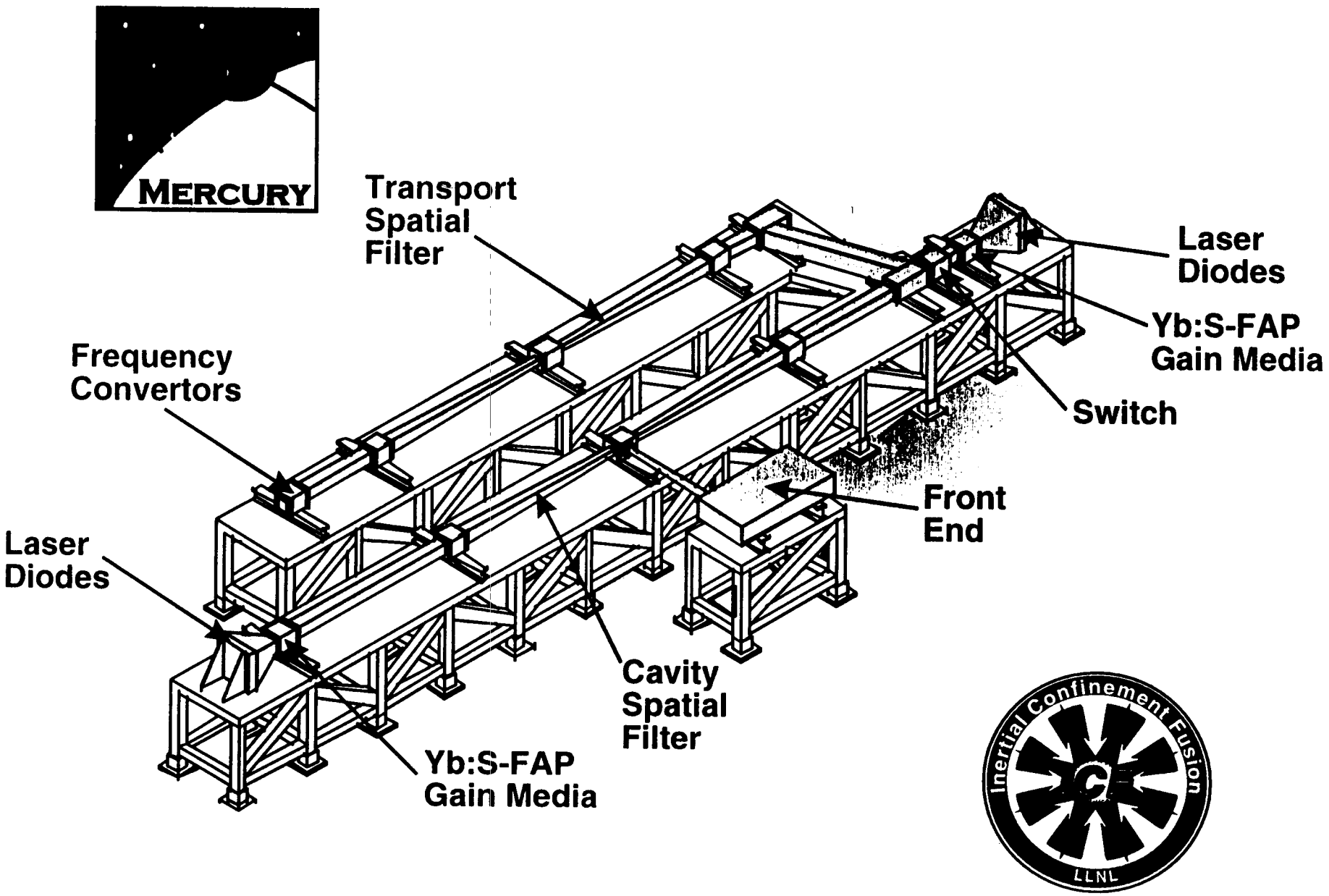

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